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Comparison of mammography image quality across different radiology departments based on the IAEA technical report on the Implementation of an Automated Quality Control Programme.

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Purpose:

Regular quality control (QC) testing of radiological images has been overlooked throughout the world, although it has been shown to reduce patient radiation exposure and improve image quality [1]. The aim of this project is to test the framework for QC of mammographic imaging systems proposed by IAEA Human Health Series n. 39 and to characterize the response from different mammography devices based on image quality and dose across different centres in the central Switzerland region.

Methods:

The proposed phantom was manufactured in-house for the purpose of this work with the following specifications: A PMMA target plate made of a 24cm×30cm×0.5cm, with a copper test object of 5cm×5cm×0.1cm and a second aluminium test object (1cm×1cm×0.02cm). For all devices (n=7), a standard protocol was used (with individual changes device-dependent on when required). The standard protocol consisted of left cranio-caudal acquisition (28 kV, 56 mAs, filter Molybdenum, target Molybdenum, 50N compression all in manual acquisition without modulation). Additionally, we varied the mAs (from 12.5 to 140) and used the available modulation options and filter/target combinations. The images were analysed with the software called ATIA and the generated files were evaluated in a Microsoft Excel routine also provided by the IAEA. SNR, SDNR, MTF horizontal (20%), MTF vertical (20%) and d' (diameter D=0.1) were compared to characterize device performance with respect to the protocol doses (Mean Glandular Dose - MGD).

Results:

For the standard protocol, the obtained SNR ranged from 33.52 to 128.68 for the tested devices. Additionally, 4.26 to 4.77, 3.39 to 7.05, 3.37 to 7.75 and 0.1 to 0.75, respectively for SDNR, MTF hor (20%), MTF vert (20%) and d'. Within a single device, the largest variation of MGD observed was from 0.17 mGy to 9.27 mGy for the evaluated protocols (considering manual, semi and automatic mode).

Conclusion:

The platform provided by the IAEA, including hardware and software, allows for preliminary characterization of mammography devices based on image quality metrics.

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